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SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING OCTOBER, 1925

By HERBERT H. KIMBALL, Solar Radiation Investigations

For a description of instruments and exposures and an account of the method of obtaining and reducing the measurements the reader is referred to the REVIEW for January, 1924, 52 : 42 and January, 1925, 53 : 29.

From Table 1 it is seen that solar radiation intensities average above the normal for October at all three stations. This is attributable, at least in part, to the prevailing low temperatures and the resulting low vapor pressures. At Washington the vapor pressure averaged only about 64 per cent of the October normal, and at Madison and Lincoln about 75 per cent.

A noon radiation intensity of 1.51 gram calories per minute per cm.² obtained at Lincoln on the 28th is within 1 per cent of the highest radiation intensity ever measured at that station in October.

Table 2 shows that the solar and sky radiation received on a horizontal surface averaged decidedly below the normal for October at all three stations. The deficiency was due to the excessive cloudiness, which averaged about 160 per cent of the October normal at Washington and Lincoln and 140 per cent at Madison.

At Washington skylight polarization measurements made on six days give a mean of 64 per cent, with a maximum of 71 per cent on the 7th. At Madison, measurements made on three days give a mean of 60 per cent with a maximum of 67 per cent on the 10th. The values for Washington are above the October averages, and those for Madison are slightly below.

TABLE 1.—Solar radiation intensities during October, 1925

[Gram-calories per minute per square centimeter of normal surface]

Washington, D. C.

Date	Sun's zenith distance											Local mean solar time
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon	
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	
Oct. 7	mm. 7.29	cal. 0.67	cal. 0.58	cal. 1.09	cal. 1.44	1.22	cal. 1.14	cal. 1.02	cal. 0.91	mm. 7.04		
8	6.50			0.98	1.37	1.56				6.27		
10	2.74		1.04	1.20	1.37	1.53				2.82		
20	3.30	0.88	0.99	1.15	1.33	1.53				2.87		
21	4.17	0.78	0.88	1.00	1.21					3.00		
23	4.75			1.03						3.99		
29	2.36	0.77	0.92	1.03	1.21	1.35				2.36		
31	3.81	0.70	0.84	1.03	1.23	1.49		1.05	0.92	0.83		
Means		0.77	0.89	1.04	1.18	1.47	(1.22)	(1.10)	(0.97)	(0.87)		
Departures		-0.01	+0.04	+0.09	+0.07	+0.01	+0.11	+0.17	+0.17	+0.17		

Madison, Wis.

Oct. 10	3.00	1.01	1.09	1.19	1.29	1.40					3.45
17	3.00	0.94	1.05		1.31	1.48					3.15
30	2.06						1.19				1.96
31	1.78	0.67	0.86	0.98	1.18	1.41					3.15
Means		0.87	1.00	(1.08)	1.26	1.43	(1.19)				
Departures		+0.13	+0.07	+0.02	+0.07	+0.05	+0.17				

¹ Extrapolated.

WEATHER OF NORTH AMERICA AND ADJACENT OCEANS

NORTH ATLANTIC OCEAN

By F. A. YOUNG

The following table shows the average sea-level pressure and departure for the month, as well as the highest and lowest barometer reading at a number of land stations on the coast and islands of the North Atlantic. The readings are for 8 a. m., seventy-fifth meridian time, and the departures are only approximate, as the normals were taken from the Pilot Chart and are based on Greenwich mean noon observations, which correspond to those taken at 7 a. m. seventy-fifth meridian time.

Stations	Average pressure	Departure	Highest	Date	Lowest	Date
St. Johns, Newfoundland	Inches 29.65	Inches -0.27	Inches 30.16	3d	Inches 29.12	9th
Nantucket	29.94	-0.06	30.46	30th	29.30	10th
Hatteras	30.01	-0.02	30.38	11th	29.64	5th
Key West	29.99	+0.01	30.12	13th	29.94	14th
New Orleans	30.02	+0.01	30.26	10th	29.84	16th
Swan Island	29.87	-0.04	29.94	12th	29.80	14th
Turks Island	30.01	+0.06	30.08	12th	29.90	5th
Bermuda	30.08	+0.05	30.26	2d	29.82	10th
Horta, Azores	29.98	-0.14	30.38	27th	29.58	19th
Lerwick, Shetland Islands	29.74	-0.05	30.30	7th	28.61	23d
Valencia, Ireland	29.85	-0.06	30.52	1st	28.67	22d
London	29.93	+0.02	30.46	2d	28.86	23d

¹ And on other dates.TABLE 1.—Solar radiation intensities during October, 1925
Lincoln, Nebr.

Date	Sun's zenith distance										Local mean solar time	
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0		5.0
Oct. 9	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.	
14	3.81			1.15	1.35	1.53	1.38	1.24	1.15	1.04	2.87	
15	6.50					1.53	1.38	1.21	1.07	0.96	4.95	
19	4.95	0.76	0.91	1.09	1.31	1.53	1.28	1.10	0.94	0.78	4.75	
20	3.00	1.00	1.14	1.27	1.42	1.60	1.42	1.27	1.14	1.04	2.49	
22	3.15		0.98	1.16	1.39	1.56	1.40	1.25	1.12	0.99	2.26	
26	4.75		0.92	1.06	1.21						5.36	
28	3.30								1.10	1.04	2.62	
30	1.24	1.02	1.16	1.34	1.48	1.68	1.46	1.18			1.82	
31	1.37				1.34		1.33	1.13	1.03	0.91	2.87	
31	3.00		0.85	1.08							3.81	
Means		0.93	0.99	1.16	1.36	1.58	1.38	1.20	1.08	0.97		
Departures		+0.03	+0.03	+0.05	+0.07	+0.08	+0.12	+0.11	+0.12	+0.12		

TABLE 2.—Solar and sky radiation received on a horizontal surface
[Gram-calories per square centimeter of horizontal surface]

Week beginning—	Average daily radiation					Average daily departure from normal		
	Washington	Madison	Lincoln	Chicago	New York	Washington	Madison	Lincoln
Oct. 1925	cal. 248	cal. 190	cal. 178	cal. 157	cal. 213	cal. -80	cal. -94	cal. -174
1	182	197	246	127	211	-125	-59	-78
15	223	182	337	166	182	-64	-47	+43
22	194	144	219	128	135	-70	-62	-45
Deficiency since first of year on Oct. 28						-812	-189	-2,499

While the average pressure for the month was not far from the normal at the last three stations given, the averages for the three decades differed materially. At Lerwick the average for the 1st decade was 30.18 inches, for the second, 29.87 inches; and for the last 11 days; 29.24 inches. At Valentia the figures for the same periods are as follows: 30.40 inches, 29.95 inches, and 29.24 inches, respectively.

Taken as a whole, this was undoubtedly one of the stormiest Octobers on record over the North Atlantic. The number of days with winds of gale force was not only much above the normal as shown on the Pilot Chart, but three of the disturbances were of exceptional severity, and the greater part of the ocean was visited by heavy weather at one time or other during the month, although comparatively moderate weather prevailed over the eastern section of the steamer lanes until the 17th. Over 150 vessels rendered storm reports, but, due to lack of space, it is impossible to give but a small portion of them in the table.

As is often the case during an unusually stormy month, the number of days with fog was much below the normal shown on the Pilot Chart. This was especially true over the Grand Banks, where fog was reported on from three to four days only, while off the coasts of America and northern Europe the frequency was about the same.